

NUTRITION BULLETIN

**Iron Deficiency in Cambodia:
The need for iron supplementation among
preschool-aged children**

Alarmingly high rates of anemia were found among preschool-aged children in rural Cambodia and prevalence was highest among children less than 24 months of age (nearly 70% with hemoglobin concentration < 11 g/dL). Because iron deficiency anemia (IDA) during childhood causes long-lasting impairments in cognitive development, ultimately resulting in lower school and work performance, increases risk of morbidity and slows growth, there is an urgent need to combat anemia among preschool-aged children. However, there are very few programs in the developing world to address this problem. This bulletin gives an overview of the issues that are involved when designing such a program and proposes specific approaches for Cambodia.

Iron deficiency anemia and its consequences

Iron deficiency and iron deficiency anemia (IDA) are major health and nutrition problems that affect two-thirds of the population in the developing world, which is approximately 3.5 billion people.¹ IDA can impair child motor development, coordination, language development and scholastic achievement. In addition, IDA can have negative psychological and behavioral effects such as inattention, fatigue, and insecurity, and also results in decreased physical activity and increased child morbidity. The longer-term consequences have large economic costs – productivity is decreased, education investments are not maximized and the burden on the health care system is increased.² While there are other causes of anemia, such as malaria and hookworm infestation, iron deficiency is the main cause of anemia in most of Cambodia.

Because of the serious and long lasting negative consequences of anemia on health and economic development, there is an urgent need to reduce the prevalence and severity of anemia in Cambodia. Although the serious consequences of iron deficiency during early childhood as well as the scale of the problem are now recognized, there are no national-scale programs in developing countries to combat anemia among preschool aged children. This bulletin assesses why there is a lack of such programs and proposes approaches to address the problem in Cambodia.

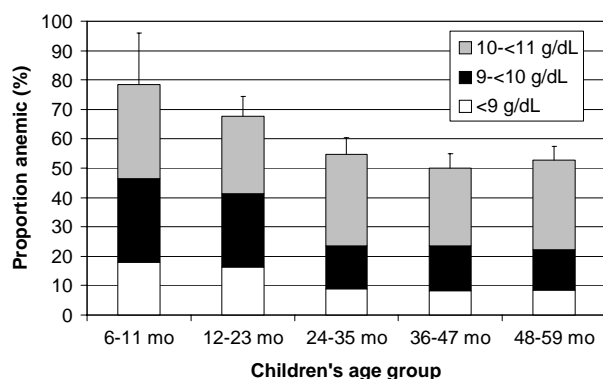
Prevalence of anemia

Results from the Cambodia National Micronutrient Survey conducted by HKI in collaboration with the Royal Cambodian Government reveal alarmingly high rates of anemia among preschool aged children. Overall, 54% of

¹ ACC/SCN. 4th Report on the World Nutrition Situation. ACC/SCN, Geneva, Switzerland, 2000.

² Gillespie SR. *Major Issues in the control of iron deficiency*. The Micronutrient Initiative, 1998.

Figure 1. Prevalence of anemia, distinguishing different levels of Hb, by age group among preschool aged children in rural Cambodia (n=1762). Bars indicate 95% Confidence Interval (CI) corrected for design effect.



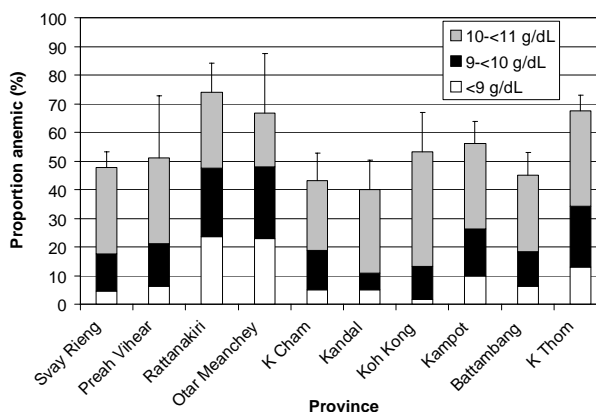
children under five years of age were found to be anemic (hemoglobin concentration, Hb, <11 g/dL). **Figure 1** shows the prevalence of anemia, distinguishing different levels of severity (indicated by Hb level), for different age groups. Anemia prevalence among children 6-11 months of age was 79% and nearly 20% had an Hb <9 g/dL. This level of severity more or less persisted into the second year of life and then declined after 24 mo of age but was still very high.

Figure 2 shows that although there were differences in the prevalence of anemia among provinces, the problem exists everywhere. The prevalence of anemia, including more severe anemia, was highest in Rattanakiri and Otar Meanchey. In Rattanakiri, the prevalence of malaria infestation among children was found to be more than 40%, which may explain part of the anemia found. In the other provinces surveyed, prevalence of malaria infestation was <10% in Preah Vihear and <5% in all others. In those provinces, iron deficiency is the main cause of anemia.

Programmatic issues of iron supplementation

While the prevalence, severity and consequences of IDA among young children have been known for some time already², to date there are very few large-scale programs to combat this problem. Because iron deficiency is most often due to a too low intake of iron of adequate bioavailability, fortification with iron is mandatory in many developed countries for foods such as complementary foods and breakfast cereals. Since this approach is not yet practical in many developing countries and will only reach a specific part of the population, and because the problem is severe and therefore requires urgent action, iron supplementation programs should be

Figure 2. Prevalence of anemia, distinguishing different levels of Hb, among children 6-59 months of age by province (n=1762). Bars indicate 95% CI corrected for design effect.



conducted. However, there are a number of issues that have delayed large-scale action, which are summarized below.

Need for very frequent consumption of supplements

Iron supplements need to be taken very regularly, at least once per week, and for young children (6-23 mo) the recommendation is to take them daily³. This has implications both for distribution of supplements, large quantities need to be available at field level, as well as for compliance, mothers or caretakers need to give the supplements to the child very regularly. These issues of logistics and compliance make iron supplementation a much more difficult intervention than for example vitamin A supplementation of underfives, in which case one high-dose capsule can be given every 4-6 months.

Dosage differs by weight

The dose of iron that should be given to a child is 2 mg iron/kg body weight/day, but the need reduces slightly with increasing age. For practical reasons, the recommended dose has been set at 12.5 mg iron + 50 µg folic acid per day for 6-23 mo old children and at 20-30 mg iron for 2-5 year old children. For the latter, there is no strict recommendation that the dose should be given daily because trials that provide it once or twice per week appear promising³. Because of the different recommendations for younger (6-23 mo) and older (2-5 y) children, it is not easy to formulate a program for all underfives. It appears best to either only target the group that is

³ Stoltzfus RJ, Dreyfuss ML. Guidelines for the use of iron supplements to prevent and treat iron deficiency anemia. INACG/WHO/UNICEF. ILSI Press, Washington, DC, 1998.

most at risk, the youngest group, or give the lower dose of 12.5 mg iron + 50 µg folic acid daily to all underfives. In the case of Cambodia, the latter would be preferred, because among 2-5 year old children the prevalence of anemia is still very high.

Choice of supplement

Finding a supplement is the most difficult aspect of designing an iron supplementation program for young children. While iron/folate pills have been available for pregnant women for many years, these are not suitable for young children who cannot easily swallow pills and crushing them results in a foul tasting powder. Until recently, the best option seemed to be a syrup or concentrated solution of iron. However, the logistical aspects of distributing glass bottles containing 30 mL syrup, sufficient for one child for two months, to a large proportion of children in a district or province would give many program managers nightmares. In addition, it appears technologically very difficult to add folate to the iron syrup.

More recently, two different kinds of supplements have been developed and are being tested – sprinkles and dispersible tablets. The sprinkles consist of coated or microencapsulated ferrous sulfate that is formed into granules, which can be added to a child's food. The dispersible tablets are similar to multivitamin/mineral supplements for children that are commercially available in many developed countries and can be chewed or dissolved in a drink. However, both the sprinkles and the dispersible tablets are not yet easily available. The companies that manufacture them have, to date, only done so for studies but are prepared to produce them in larger quantities.

Iron supplementation for children in Cambodia – suggestions

Because rates of anemia among underfives in Cambodia are very high, and because it will not be possible to increase iron intake adequately through the diet in Cambodia in the short run⁴, there is an urgent need to explore whether iron supplements can be effectively delivered to reduce anemia among this high-risk group. However, since very little work has been done with iron supplementation among preschool aged children, worldwide, there is little

information available on effective strategies, programs, or lessons to be learned from countries facing a similar problem. There is thus an urgent need, both for Cambodia as well as for other countries, to explore possible delivery mechanisms.

Based on the above programmatic considerations, we suggest that a dispersible tablet containing 12.5 mg iron and 50 µg folic acid is taken daily by all children aged 6-59 mo of age. Such a supplement can be delivered through the existing health system or through ongoing non-governmental organization (NGO) programs that have a successful community-based component.

The Ministry of Health (MOH) has recently issued guidelines for outreach services. These are services that should be delivered to all villages (except the one where the health center is located) twice a month.⁵ Such services include vaccination and vitamin A capsules. Thus, one possibility would be to include iron supplements for preschool aged children among integrated outreach services. How often supplements should be distributed and who should monitor delivery are among some of the programmatic issues that need to be investigated.

In addition to the health system, many community-based NGO programs are being implemented. These programs have a strong network of community members who are already active in health and other interventions. It could be possible to distribute supplements through NGOs or to point persons in the community. Community members, such as village health volunteers, health center feedback committee members or others, could assist in delivery of supplements and monitoring of distribution and compliance, while keeping in close communication with health center staff. Details of such an intervention need to be examined or tested.

Both strategies should involve training of staff, whether health center or NGO staff, and community members. At the same time that delivery systems are being developed, demand creation at the community-level for iron supplements needs to be conducted through mass media and interpersonal communication. Communication messages should be formulated based on formative research to ensure that they are appropriate for the target audience.

⁴ Nestel P, Alnwick D. Iron/multi-micronutrient supplements for young children. Summary and conclusions of a consultation held at UNICEF, Copenhagen, Denmark, August 19-20, 1996. INACG/UNICEF. ILSI Press, Washington, DC, 1997.

⁵ MOH. Guidelines for Outreach Services from Health Center. March 2001.

Recommendations

- Provision of iron/folate supplements to children aged 6-59 mo should be undertaken to prevent IDA. The preferred supplement would be a dispersible tablet containing 12.5 mg iron and 50 µg folic that is given daily to all children aged 6-59 mo.
- Effective delivery systems for such supplements need to be explored, including outreach services of the health system and on-going NGO programs.
- Any program delivering iron/folate supplements to preschool-aged children should have an effective program monitoring system in place and the impact on anemia prevalence needs to be assessed regularly.
- Programs that increase the production and availability of micronutrient-rich foods, particularly animal foods and fortified foods, should be expanded as should programs to improve breastfeeding practices and to improve the quality and timely introduction of appropriate foods for infants.

C A M B O D I A

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